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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/069,617	02/27/2002	Moon Bae Ko	MR2685-110	3475
4586	7590	11/18/2003	EXAMINER	
ROSENBERG, KLEIN & LEE 3458 ELLICOTT CENTER DRIVE-SUITE 101 ELLICOTT CITY, MD 21043			WYROZEBSKI LEE, KATARZYNA I	
			ART UNIT	PAPER NUMBER

1714

DATE MAILED: 11/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/069,617

Applicant(s)

KO ET AL.

Examiner

Katarzyna Wyrozowski Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_ 6) ☐ Other:

*Claim Rejections - 35 USC § 112*

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

2. Claim 4 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 contains limitation of molecular weight. Term “molecular weight” renders claim indefinite as it is not clear what type of molecular weight the applicants are referring to. The applicants also do not disclose in the specification a method by which molecular weight was determined so that the examiner could make proper judgment. This rejection can be overcome by stating if the molecular weight is weight average, number average or any other and submitting proper affidavit disclosing what type of molecular weight is claimed and the method in which such molecular weight has been determined.

*Claim Rejections - 35 USC § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 7-9 are rejected under 35 U.S.C. 102(a) as being anticipated by PANTOUSTIER (e-polymers.com).

The prior art of PANTOUSTIER discloses a nanocomposite composition comprising clay and poly( $\epsilon$ -caprolactone) (PCL) prepared by melt intercalation.

According to Abstract of PANTOUSTIER clay component, such as montmorillonite, is pre-treated with alkylammonium compound.

Poly( $\epsilon$ -caprolactone) of the prior art of PANTOUSTIER has Mn of 49,000 and Mw/Mn of 1.4, which results in Mw of 68,600 (Experimental section). The alkyl ammonium compound and PCL of PANTOUSTIER have been melt processed and shaped into test pieces.

Example C3 contains ammonium compound that satisfies formula 3 of the present invention. Per discussion above table 1 on page 4, ammonium compounds are obtained by protonation of the corresponding amine. Such step has to be made so that the ammonium compound can undergo cation exchange with cations otherwise naturally occurring in the clay component.

In the light of the above disclosure the prior art of PANTOUSTIER anticipates requirements of claims rejected above.

5. Claims 1, 6-10 are rejected under 35 U.S.C. 102(e) as being anticipated by BARBEE (US 6,384,121).

The prior art of BARBEE discloses composition for polymer clay composite that has excellent gas barrier property.

According to Example 1 of the prior art of BARBEE discloses use of oligomeric polycaprolactone having number average molecular weight of 2000 as intercalating agent. The mixture was blended and filtered as a concentrate or batch. Following in example 20, so formed batch was incorporated into PET as a matrix resin, melt processed and extruded into nanocomposite.

According to the specification of BARBEE, the master batch comprises 20-99.5 wt% of oligomeric intercalant such as that of utilized polycaprolactone and 0.5-80 wt % of clay. The compounding utilized 1-50 wt % of master batch and 50-99 wt % of matrix polymer (col. 14, lines 26-39. The specification further teaches that any melt-processible polymer can be utilized as matrix polymer and these include polystyrenes, polyacrylates and vinyls (col. 6, lines 1-6).

Clay component of the prior art of BARBEE is smectite type clay such as montmorillonite and is utilized in entire composition in amount less than 25 wt % (claims 6-8). Clay is also pretreated with organic cation such as bis(hydroxyethyl octadecyl methyl ammonium cation. Counter cation is a halide, which include chlorine, bromine or fluoride (col. 11, lines 62-65).

In the light of the above disclosure, the prior art of BARBEE anticipates requirements of claims rejected above.

6. Claims 1, 7-9 are rejected under 35 U.S.C. 102(e) as being anticipated by BARBEE (US 6,034,163).

The prior art of BARBEE discloses composition for polymer clay composite that has excellent gas barrier property.

According to Example 12 (col. 8) of the prior art of BARBEE organically modified montmorillonite clay is utilized. The ammonium compound utilized is bis(hydroxyethyl) methyl tallow ammonium chloride. Expanding agent utilized is polycaprolactone. The mixture was blended and filtered as a concentrate or batch. The matrix polymer of the prior art of BARBEE is selected from methacrylated styrene-butadiene polymers, vinyl polymers, acrylonitrile polymers, polyolefins and the like (claim 7).

According to the specification organic cation in addition to that utilized in the example include bis(hydroxyethyl) methyloctadecyl ammonium cation. Counter cation is a halide, which include chlorine, bromine or fluoride (col. 4, line 15-17).

Clay component of the prior art of BARBEE is smectite type clay such as montmorillonite and is utilized in entire composition in amount of 0.01- 25 wt % (col. 3, lines 2-4).

According to the specification of BARBEE, the first step of the process is to render clay an organoclay with use of alkylammonium compound (col. 4, lines 36-38). Next the intercalated clay is mixed with expanding agent such as PCL from example 12 (col. 4, lines 48-50). The third step is incorporation of the expanded clay into matrix polymer by melt processing (col. 5, lines 10-12). The molecular weight of the expanding polymers is in a range of 250-25,000 (col. 5, lines 8-9).

In the light of the above disclosure, the prior art of BARBEE anticipates requirements of claims rejected above.

*Claim Rejections - 35 USC § 103*

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

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invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 2-5 rejected under 35 U.S.C. 103(a) as being unpatentable over BARBEE (US 6,384,121) or BARBEE (US 6,034,163) either one of which in view of BRAGODIA (US 6,395,386).

The discussion of the disclosure of the prior art of BARBEE'121 or BARBEE'386 from paragraph 5 or 6 of this office action is incorporated here by reference.

The difference between the present invention and the disclosure of the prior art of BARBEE'121 or BARBEE'386 is use of different matrix polymers in addition to those already disclosed.

With respect to the above difference, the prior art of BRAGODIA, which also discloses use of ammonium modified smectite clay such as montmorillonite pretreated with expanding agents (col. 8, lines 52-60). One of those expanding agents is also polycaprolactone and ammonium compound is the same as that utilized in BARBEE disclosures (col. 10, lines 15-16).

According to claim 6 of BRAGODIA, matrix polymer in addition to those named by BARBEE include polyvinyl chloride.

Polyvinyl chloride of BRAGODIA is a melt processible polymer containing functional group that can be utilized in nanocomposite, which has composition very similar to those of BARBEE.

In the light of the above disclosure, it would have been obvious to one having ordinary skill in the art at the time of the instant invention to utilize PVC in the composition of BARBEE



and thereby obtain the claimed invention. Use of PVC as matrix polymer would also result in formation of nanocomposite.

11. Claims 2-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over LI (US 6,060,549).

The discussion of the disclosure of the prior art of BARBEE'121 or BARBE'386 from paragraph 5 or 6 of this office action is incorporated here by reference.

The difference between the present invention and the disclosure of the prior art of BARBEE'121 or BARBE'386 is use of different matrix polymers in addition to those already disclosed.

With respect to the above difference, the prior art of LI discloses composition comprising expanded clay. The list of melt-processible polymer that can be used as matrix polymers include in addition to polylactones, styrene-acrylonitrile-butadiene copolymers, styrene-acrylonitrile copolymers and the like.

The clay of LI is intercalated with quaternary ammonium compounds (col. 6, lines 25-44).

The reason why these polymers are equally capable of forming nanocomposite is that they all contain functional groups such as nitrogen, oxygen or unsaturation capable of reacting with organic compounds of ammonium intercalated clay.

In the light of the above disclosure, it would have been obvious to one having ordinary skill in the art at the time of the instant invention to utilize styrene polymers of LI in the composition of BARBEE and thereby obtain the same invention. Use of styrene polymers of LI

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as matrix polymers would still result in formation of nanocomposite as the prior art of BARBEE also intercalates the clay with ammonium compounds.

Beginning December 8, 2003 the new phone number to the examiner of record will be (571)-272-1127.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katarzyna Wyrozebski Lee whose telephone number is (703) 306-5875. The examiner can normally be reached on Mon-Thurs 6:30 AM-4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on (703) 306-2777. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

*Katarzyna Wyrozebski Lee*  
Katarzyna Wyrozebski Lee  
Primary Examiner  
Art Unit 1714

November 12, 2003